

FINAL MANUSCRIPT
OPERATOR'S AND ORGANIZATIONAL
MAINTENANCE MANUAL

RADIO SETS
AN/TRC-77 AND AN/TRC-77A

ARVIN INDUSTRIES, INC.

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OPERATOR'S AND ORGANIZATIONAL
MAINTENANCE MANUAL

RADIO SETS

AN/TRC-77 and AN/TRC-77A

THE UNIVERSITY OF CHICAGO

DEPARTMENT OF THE HISTORY OF ARTS

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NOTE TO PRINTER: Place the following on the inside of the front cover.

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

Be careful when working on the following transmitter and power supply circuits:

+400-volt power amplifier plate supply

-175-volt power amplifier bias supply

+120-volt oscillator plate supply

Serious injury or death may result from contact with these voltages.

DON'T TAKE CHANCES!

TECHNICAL MANUAL) HEADQUARTERS,
)
) DEPARTMENT OF THE ARMY,
)
 NO. 11-5820-473-12) WASHINGTON 25, D. C. , 1965

RADIO SETS AN/TRC-77 and AN/TRC-77A

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Figure 1. Radio Set AN/TRC-77(*).

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

a. This manual describes Radio Sets AN/TRC-77 and AN/TRC-77A (fig. 1) and covers its installation, operation, and operator's and organizational maintenance. It includes operation under usual and unusual conditions, cleaning and inspection of the equipment, and replacement of parts available to the first and second echelon maintenance levels.

b. Official nomenclature followed by (*) is used to indicate all models of the equipment items covered in this manual. Thus, AN/TRC-77 (*) represents Radio Sets AN/TRC-77 and AN/TRC-77A.

2. Index of Publications

Refer to the latest issue of DA PAM 310-4 to determine whether there are new editions, changes, or additional publications pertaining to your equipment. Department of the Army Pamphlet No. 310-4 is an index of current Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders that are available through publications supply channels. The index lists the individual parts (-10, -20, -35P, etc.) and the latest changes to and revisions of each equipment publication.

3. Forms and Records

- a. Reports of Maintenance and Unsatisfactory Equipment. Use equipment forms and records in accordance with instructions in TM 38-750.
- b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58 (Army), NAVSANDA Publication 378 (Navy), and AFR 71-4 (Air Force).
- c. Comments on Manual. Forward all comments on this publication direct to: Commanding Officer, U. S. Army Electronics Material Support Agency, ATTN: SELMS-MP, Fort Monmouth, New Jersey. (DA Form 1598 (Record of Comments on Publication), DA Form 2496 (Disposition Form), or letter may be used.)

Section II. DESCRIPTION AND DATA

4. Purpose and Use

a. Radio Set AN/TRC-77(*) provides for multi-channel, two-way communication within the frequency range of 3.0 to 8.0 megacycles (mc). The radio set operates on any one of six predetermined frequencies.

b. Radio Set AN/TRC-77(*) is intended for use as a portable field transmitter-receiver and may be used in conjunction with both field and station installations. The radio set can receive both amplitude-modulated (am) and continuous-wave (cw) signals but is limited to cw transmission only.

c. The average working range of the radio set is from 5 to 7 miles. The transmitter and receiver portions of the radio set have separate channel selection and may be operated on different frequencies.

d. The transmitter may be operated by a hand key or by an automatic keying device. The maximum keying speed of the transmitter is 300 words a minute.

5. Technical Characteristics

a. Transmitter

Number of tubes	2.
Number of transistors	6.
Frequency range	3.0 to 8.0 mc, with provision for presetting any six frequencies.

a. Transmitter (cont).

Type of transmission Cw.

Type of control Crystal.

Distance range 5 to 7 miles.

Power requirements 3.75 amperes at 12 volts.

Power supply 12-volt battery.

Power output 10 to 14 watts.

Keying speed 300 words-per-minute max.

Antennas 3, long-wire type, 25, 40, and
57 ft. in length.

b. Receiver.

Receiver type Superheterodyne.

Number of transistors 11.

Frequency range 3.0 to 8.0 mc.

Types of signals received Telegraph (cw or mcw) and voice.

Sensitivity

Cw 1.0 microvolt for 1.0 mw signal
plus noise to noise ratio.

Am 2.2 microvolts for 1.0 mw signal
plus noise to noise ratio.

b. Receiver (cont).

Intermediate frequency	455 kc.
Bandwidth	5 to 6 kc (6 db down). 11 kc (60 db down).
Frequency control	Crystal controlled oscillator.
Power input	20 ma max at 12 v (nominal).
Power supply	12-volt battery.
Power output	1 mw (nominal).
AGC	In am mode only.
BFO	455 kc \pm 4 kc.
Antennas	Same as transmitter.

c. Battery BB-447(*)/TRC-77.

Voltage	12 volts (nominal).
Capacity	14 ampere - hours.

6. Components of Radio Set AN/TRC-77(*)

The components of Radio Set AN/TRC-77(*) (fig. 1) are listed in the following table:

Quantity	Item	Height (in.)	Depth (in.)	Width (in.)	Unit Weight (lb)
1 ^a	Receiver-Transmitter, Radio RT-654A/TRC-77	10	4-3/8	10-1/2	11.0
1 ^b	Receiver-Transmitter, Radio RT-654/TRC-77	10	4-3/8	10-5/8	12.9
1	Antenna AT-1098/TRC-77	--	--	--	2.6
1	Bag, Cotton Duck CW-618/TRC-77	--	--	--	.7
2 ^a	Battery Assembly BB-447A/TRC-77	6-5/8	4	10-1/2	13.8
2 ^b	Battery Assembly BB-447/TRC-77	6-5/8	4	10-1/2	13.8
1	Cover, Battery Box CW-619/TRC-77	1	4-1/2	10-1/2	.8
1 ^a	Cable Assembly, Power, Electrical CX-11127/U	--	--	--	.8
1 ^b	Cable Assembly, Power, Electrical C22687	--	--	--	.8
1	Cable Assembly, Special Purpose, Electrical CX-()	--	--	--	.5
1 ^a	Headset, H140A/GR	--	--	--	1.4
1 ^b	Headset, NT-49507B	--	--	--	1.4
1	Key, Type J-45	--	--	--	.9
	^a Used on Radio Set AN/TRC-77A				
	^b Used on Radio Set AN/TRC-77				

7. Common Names

A list of the nomenclature assignments for the components of Radio Set AN/TRC-77(*) is given below. A common name is indicated after each item.

Nomenclature	Common Name
Radio Set AN/TRC-77(*)	Radio set
Receiver-Transmitter, Radio RT-654(*)/TRC-77	Receiver-transmitter
Antenna AT-1098/TRC-77	Antenna system
Bag, Cotton Duck CW-618/TRC-77	Accessory bag
Battery Assembly BB-447(*)/TRC-77	Battery
Cover, Battery Box CW-619/TRC-77	Battery cover
^a Cable Assembly, Power, Electrical CX-11127/U	Auxiliary power cable
^b Cable Assembly, Power, Electrical C22687	Auxiliary power cable
Cable Assembly, Special Purpose, Electrical CX-()	Keyer adapter cable
^a Headset, H140A/GR	Headset
^b Headset, NT-49507B	Headset
Key, Type J-45	Key
^a Used on Radio Set AN/TRC-77A	
^b Used on Radio Set AN/TRC-77	

8. Description of Major Components

a. Receiver-Transmitter, Radio RT-654(*)/TRC-77. The receiver and transmitter are mounted on the same chassis within a single case. The same antenna is used for both receiving and transmitting. The receiver-transmitter is mounted on top of the battery and secured with toggle clamps located on each side of the case (fig. 1). The front panel with all transmitter and receiver controls is located on top of the main chassis. Two carrying handles are mounted on the panel. The case and chassis are separated by unfastening the two toggle clamps, one on each side of the panel just below the handles. After unfastening the toggle clamps, the chassis and panel slide out of the case as a unit. Major transmitter and receiver circuits are contained on individual circuit boards which are mounted on the transmitter or receiver side of the main chassis.

b. Battery Assembly BB-447(*)/TRC-77.

The battery is a nickel-cadmium type and has 10 cells. The electrolyte is a 30-percent solution of potassium hydroxide, and the output of each cell is 1.2 volts. The battery is not damaged by either over-discharging or over-charging. The level of the electrolyte in each cell is an indication of the state of charge on the battery. Window openings in the battery case show the electrolyte level. As the battery discharges, the plates contract, causing the electrolyte level to drop. As the battery charges, the plates expand and the electrolyte level rises due to the increased volume of the plates. A cable from the battery supplies power to the receiver-transmitter through the power connector at the bottom of the receiver-transmitter case (fig. 2). The battery case is clamped to the receiver-transmitter when the radio set is in operation.

Figure 2. Battery connections.

c. Antenna AT-1098/TRC-77. The antenna system is comprised of three separate long-wire antennas, a counterpoise wire, two antenna support cords, and two support cord lead weights. The counterpoise wire serves as a ground for the system. Descriptive data on the antenna system components are listed below.

Item	Color	Length (ft)
Antenna	White	57
Antenna	Purple	40
Antenna	Red	25
Counterpoise	Black	50
Antenna support cord	White	50
Antenna support cord	White	100

9. Description of Minor Components

a. Key, Type J-45. This telegraph key is used to manually key the transmitter in the radio set. Its speed depends upon the operator's experience. It is provided with a horseshoe knee clip to facilitate field operation.

b. Headset, Types H140A/GR and NT-49507B. The headset is a part of the radio set and is required to monitor both incoming signals and signals being transmitted. It has an adjustable headband and an input impedance of 600 ohms.

c. Cable Assemblies, Power, Electrical CX-11127/U and C22867. This cable is used when it is necessary to provide power to the receiver-transmitter from a source other than the battery provided.

d. Cable Assembly, Special Purpose, Electrical CX-(). This cable is used to connect an automatic keying device to the transmitter keying circuits. It also is used to provide power to the keying device from the radio set battery.

e. Bag, Cotton Duck CW-618/TRC-77. This bag is used to store the following items:

- (1) Key
- (2) Headset
- (3) Antennas and counterpoise
- (4) Antenna support cords and weights
- (5) Auxiliary power cable
- (6) Keyer adapter cable.

10. Differences in Models

The differences between Radio Set AN/TRC-77 and Radio Set AN/TRC-77A (fig. 3) are as follows:

Item	AN/TRC-77	AN/TRC-77A
Receiver-transmitter	7-pin power connector	2-pin power connector
Battery	7-pin cable connector	2-pin cable connector
Auxiliary power cable	7-pin connector	2-pin connector
Headset	Telephone-type plug	Twist-lock type plug

TM 5820-473-12-3

Figure 3. Differences in models.

CHAPTER 2

INSTALLATION

11. Unpacking

a. Packaging Data. Radio Sets AN/TRC-77(*) are shipped three sets at a time in a wooden packing crate. Each radio set and its components are packaged in separate fiberboard boxes within the crate. A typical shipping crate and its contents are shown in figure 4.

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Figure 4. Typical packaging of Radio Set AN/TRC-77(*).

b. Removing Contents. Perform all the steps outlined below when unpacking the equipment.

- (1) Cut and fold back the metal straps.
- (2) Remove the nails from the top of the box with a nail puller. Remove the top of the box. Do not attempt to pry off the top of the box or damage to the equipment may result.

(3) Open the fiberboard boxes within the crate and remove the contents.

12. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6 (para 2).

b. See that the equipment is complete as listed on the packing slip. If a packing slip is not available, check the equipment against the basic issue items list (appx II). Report all discrepancies in accordance with TM 38-750. Shortage of a minor assembly or part that does not affect proper functioning of the equipment should not prevent use of the equipment.

c. If the equipment has been used or reconditioned, see whether it has been changed by a modification work order (MWO). If the equipment has been modified, the MWO number will appear on the front panel near the nomenclature plate. Check to see whether the MWO number (if any) and appropriate notations concerning the modification have been entered in the equipment manual.

Note: Current MWO's applicable to the equipment are listed in DA PAM 310-4.

13. Preparing the Equipment for Use

Caution:

1. Never add distilled water to the discharged battery except when specifically instructed to do so. To do otherwise will defeat the non-spill feature of the battery.

2. Never add water to the battery which may be contaminated with traces of copper. To do so will damage the battery cells.

a. Charging the Batteries. There is no easy way to determine the state of charge on the battery while in the field. The capacity of a fully charged battery is 14 ampere-hours. Because of power loss during charging, it takes 20 ampere-hours charge to bring the battery to a fully charged state. Since the battery cannot be damaged by overcharging, whenever the condition of charge on a battery is in doubt, the battery should be given a full charge. Normally it will require 4 hours to charge a battery on the ac battery charger and 2 hours on the dc battery charger. To charge the battery, proceed as follows:

(1) Remove the jumper wire from the terminals on the side of the battery case.

(2) Charge the batteries with either AC Battery Charger PP-3251(*)/TRC-77 or DC Battery Charger PP-3252(*)/TRC-77 using the appropriate operating procedures contained in Chapter 7.

(3) After the battery has been fully charged and allowed to stand for several hours, add enough distilled water to bring the electrolyte level up to the black lines seen through the windows in the battery case.

b. Key Adjustment.

(1) Adjust the lateral pivot screws on each side of the armature to position the electrical contact on the armature directly over the stationary contact on the base.

- (2) Adjust the travel screw at the end of the armature for approximately 1/16 inch between the electrical contacts.
- (3) Adjust the tension screw at the center of the armature for best key operation.

c. Initial Assembly.

Caution: Before connecting the battery to the receiver-transmitter, set the OFF-RCVR-XMIT switch on the receiver-transmitter front panel to the OFF position, otherwise, damage to the equipment may result.

- (1) Connect the battery cable to the jack on the bottom of the receiver-transmitter case (fig. 2) taking care that the keyway on the cable plug meets the key on the power jack to ensure proper polarity.
- (2) Stow excess battery cable in the recess in the battery case.
- (3) Position the receiver-transmitter on top of the battery and secure in place with the two toggle clamps provided (fig. 2).

14. Siting

When locating the antenna, consider the following:

a. Radio signals are absorbed and sometimes reflected by near-by obstructions, such as hills, metal buildings and bridges, or telephone lines that extend above the height of the antenna (fig.5). Transmitted signals have a greater range when the antenna is as high above ground as possible. Transmission and reception are best over water or level ground.

b. If transmission and reception in all directions are required, place the antenna on the highest hill within the operating area.

c. When in rear areas, avoid placing the set near sources of electrical interference, such as power or telephone lines, radar sets, and field hospitals.

d. Try several locations within the general area and select the one that provides the best signal reception from the desired stations.

e. Enemy jamming action against the receiver is always a possibility. The effects of enemy jamming may be reduced by locating the antenna so that near-by obstructions act as a screen in the direction of probable sites of enemy jamming transmitters. This screening action may also reduce the transmitted signal strength in a direction toward the enemy, thereby making it more difficult for the enemy to intercept the signals.

15. Installation of Equipment

(fig. 5)

The installation of Radio Set AN/TRC-77(*) includes placing the radio set at the selected site, stringing the antenna, attaching the counterpoise, connecting the headset, and connecting the key on the automatic keying device. The installation procedures are as follows:

TM 5820-473-12-5

Figure 5. Typical radio set installation.

a. Antenna. The length of the antenna wire to be used depends on the transmitting frequency and should be selected in accordance with the following chart. Install the antenna as outlined in steps (1) through (3) below.

Antenna length data			
Antenna length	Color	Channel	Frequency
57 ft.	White	1	3000 kc
40 ft.	Purple	2	4060 kc
	Purple	3	5100 kc
	Red	4	6000 kc
25 ft.	Red	5	7000 kc
	Red	6	8000 kc

- (1) Connect the connector on the selected antenna to the ANT. terminal on the receiver-transmitter front panel.
- (2) Unwind the antenna from its bobbin in the general direction of a tree limb or other high support to be used. Fasten one of the antenna support cords to the loose end of the antenna and attach a weight to the other end of the cord.
- (3) String the antenna by throwing the weight over the support and drawing the antenna tight.

b. Counterpoise. Install the counterpoise as follows:

- (1) Connect the connector on the counterpoise to the GRD terminal on the receiver-transmitter front panel.

(2) Unwind the counterpoise from its bobbin in the opposite direction of the antenna, and spread the ends of the counterpoise out on the ground until they are 90 degrees apart.

c. Headset. Connect the headset to the PHONES jack on the receiver-transmitter front panel.

d. Key. If the transmitter is to be keyed manually, connect the key to the KEY jack on the receiver-transmitter front panel.

e. Keyer Adapter Cable. If the transmitter is to be keyed by an automatic keying device, connect the keyer adapter cable to the KEY jack on the receiver-transmitter front panel and the 2 power leads to the appropriate terminals at the side of the battery. Connect the other end of the keyer adapter cable to the automatic keying device.

CHAPTER 3
OPERATING INSTRUCTIONS

Section I. OPERATOR'S CONTROLS, INDICATORS,
SWITCHES, AND JACKS

16. Damage from Improper Settings

When setting the controls, check to see that the INDICATOR RANGE switch on the receiver-transmitter front panel is in the OFF position before setting the OFF-RCVR-XMIT switch to the XMIT position.

17. Receiver-transmitter RT-654(*)/TRC-77 Controls, Switches, Indicators, and Jacks

(fig. 6)

TM 5820-473-12-6

Figure 6. Front panel controls, indicators, switches, and jacks.

Control, indicator, switch, or jack	Function
ANT. terminal	Connects antenna to receiver-transmitter.
GRD terminal	Connects counterpoise to receiver-transmitter.
ANT. TUNING INDICATOR	Indicates transmitter power output.
INDICATOR RANGE selector switch	Selects ANT. TUNING INDICATOR sensitivity.
ANT. TUNE selector switch	Tunes antenna circuit.
XMTR CHANNEL selector switch	Selects transmitter frequency.
KEY jack	Connects key to receiver-transmitter.
OFF-RCVR-XMIT selector switch	Selects operation mode.
RF GAIN control	Adjusts gain of receiver rf stages.
BFO PITCH control	Adjusts frequency of beat frequency oscillator in CW mode.
VOL control	Adjusts audio level at the headset.
RCVR CHANNEL selector switch	Selects receiver frequency.
AM-CW selector switch	Selects voice or code modulated signals in receiver
PHONES jack	Connects headset to receiver-transmitter.

Section II. OPERATION UNDER USUAL CONDITIONS

18. Types of Operation

The radio set is operated locally. It can receive both amplitude modulated and continuous wave signals. The transmitter can be operated by a manual telegraph key or by an automatic keying device at up to 300 words-per-minute.

19. Preliminary Starting Procedure

Perform the preliminary operations listed below before operating the equipment (para 20). Make certain that the radio set has been properly installed (para 15).

- a. Set the OFF-RCVR-XMIT switch on the receiver-transmitter front panel to OFF.
- b. Set the INDICATOR RANGE switch to OFF.
- c. Set the XMTR CHANNEL switch to the desired transmitter channel.
- d. Set the RCVR CHANNEL switch to the desired receiver channel.
- e. Set the ANT. TUNE switch to position 1.
- f. Set the AM-CW switch to the desired receiver mode.
- g. Set the BFO PITCH control to 0.
- h. Set the RF GAIN control and the VOL controls to the approximate center of their ranges.
- i. If the automatic keying device is installed, disconnect the automatic keying device from the KEY jack and connect the telegraph key to the KEY jack.

20. Operating Procedures

Warning: The following procedures require the breaking of radio silence imposed by any command. Unauthorized violation of radio silence could result in courts martial or possible death from enemy fire.

a. Transmitter Operations.

- (1) Set the OFF-RCVR-XMIT switch to XMIT and allow two minutes for the radio set to warm up before proceeding.
- (2) Set the INDICATOR RANGE switch to 1.
- (3) Close the key (for not more than 30 seconds) and rotate the ANT. TUNE switch until the brightest indication is obtained on the ANT. TUNING INDICATOR.
- (4) If the ANT. TUNING INDICATOR does not glow, set the INDICATOR RANGE switch to 2 and repeat step (3) above.
- (5) If the ANT. TUNING INDICATOR still does not glow, set the INDICATOR RANGE switch to 3 and repeat step (3) above.
- (6) Set the INDICATOR RANGE switch to OFF.
- (7) If the automatic keying device is to be used, disconnect the telegraph key from the KEY jack and connect the automatic keying device to the KEY jack.
- (8) Operate the transmitter using the key or the automatic keying device.

b. Receiver Operations.

- (1) Set the OFF-RCVR-XMIT switch to RCVR.

- (2) Adjust the VOL control for the desired audio level at the headset.
- (3) Adjust the RF GAIN control for the desired signal level at the headset.
- (4) If the receiver is being operated in the CW mode, adjust the BFO PITCH control for the most desirable audio tone.

21. Recognition and Identification of Jamming

It is likely that under real or simulated tactical conditions, the receiver will be jammed by the enemy. Enemy jamming is easily done by transmitting a strong signal on the same frequency, thereby making it difficult or impossible to hear the desired signal. Unusual noises or strong interference heard on the receiver may be enemy jamming, signals from a friendly station, noise from a local source, or the receiver may be defective. To determine whether or not the interference is originating in the receiver, disconnect the antenna, remove the antenna, or short the ANT. post to the GRD terminal. If the interference continues, the receiver is defective. Enemy jamming signals may be typed as continuous wave or modulated. A jamming signal may be intended to block a single frequency. This is called spot jamming. The enemy may use one or several transmitters to jam a block or band of frequencies. This method is called barrage jamming.

a. Continuous-wave Jamming. Cw jamming is transmitted as a steady carrier. This signal beats with another signal and produces a steady tone in the headset. Cw jamming signals may also be keyed by using a random on and off signal or using actual code characters keyed at the same rate or a little faster than the signal being received.

b. Modulated Jamming. Modulated jamming signals may consist of noise, laughter, singing, music, various tones, or most any unusual sound, or it may be a combination of these sounds. Various types of modulated jamming signals are explained below.

- (1) Spark. This is one of the simplest, most effective, and most easily produced jamming signal. This type of signal sounds very rough, raspy, and sometimes like an electric motor with sparking brushes running. This type of signal is very broad; therefore, it will interfere with a large number of communication channels.
- (2) Sweep-through. This signal is the result of sweeping or moving a carrier back and forth across your frequency at a slow or rapid rate. The numerous signals of varying amplitude and frequency produce a sound like that of a low-flying airplane passing overhead. This type of jamming is effective over a broad range of frequencies. When it is varied rapidly, it is effective against all types of voice signals.
- (3) Stepped tones or bagpipes. This signal usually consists of several separate tones. The tones are transmitted in the order of first increasing and then decreasing pitch, repeated over and over. The audible effect is like the sound of a Scottish bagpipe.

- (4) Noise. Noise is random both in amplitude and frequency. It is considered one of the better types of jamming modulation. It produces a sound similar to that heard when a receiver is not tuned to a station and the volume or gain control is turned to maximum.
- (5) Gulls. This signal consists of a quick rise and slow fall of a variable audio frequency. The sound is similar to the cry of the sea gull.
- (6) Tone. This signal consists of a single audio frequency of unvarying tone. It produces a steady howl in the headset. Another use of tone is to vary it slowly. It produces a howling sound of varying pitch.

22. Antijamming

When it is known that a receiver is being jammed, the operator will notify the immediate superior officer immediately and continue to operate the equipment. To provide maximum intelligibility of jammed signals, follow the operational procedure below:

- a. Operate the receiver as outlined in paragraph 20b.
- b. Vary the RF GAIN control. This may reduce the jamming signal enough to permit the weaker wanted signal to be heard.
- c. Vary the VOL control. The level of the desired signal may be raised enough to be heard.
- d. If the above procedures do not provide sufficient signal separation for operation, change to the alternate frequency and alternate call sign.

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23. Stopping Procedure

The entire radio set may be shut down or power may be removed from either the receiver or transmitter as follows:

- a. To remove power from both the receiver and transmitter, set the OFF-RCVR-XMIT switch to OFF.
- b. To remove power from the transmitter only, set the OFF-RCVR-XMIT switch to RCVR.
- c. To remove power from those receiver circuits not required during transmitter operations, set the OFF-RCVR-XMIT switch to XMIT.

Section III. OPERATION UNDER UNUSUAL CONDITIONS

24. Operation at Low Temperatures

At low temperatures, the batteries used in the radio set have poor efficiency, and transmitter performance may become unsatisfactory. To avoid this condition batteries should be kept as warm as possible. It may be necessary to disconnect the battery from the receiver-transmitter and to use the auxiliary power cable to connect the receiver-transmitter to an external power source.

Caution: Never attempt to operate the radio set from a voltage source greater than 17 volts. To do so will damage the radio set and make it inoperative.

25. Operation under Tropical Conditions

When operated in tropical climates, the radio set may be operated in swampy areas where extreme moisture conditions exist. The high relative humidity causes condensation of moisture on the radio set whenever the temperature of the equipment becomes lower than that of the air. Try to keep the radio set dry.

CHAPTER 4

OPERATOR'S MAINTENANCE INSTRUCTIONS

26. Scope

The maintenance duties assigned to the operator of Radio Set AN/TRC-77(*) are listed below together with references to the paragraphs covering the specific maintenance functions. The duties assigned do not require any tools or test equipment.

- a. Daily Preventive Maintenance Checks and Services (para 29).
- b. Cleaning (para 30).
- c. Troubleshooting (para 31).
- d. Repairs (para 32).

27. Preventive Maintenance

Preventive maintenance is the systematic care, servicing, and inspection of the radio set to prevent the occurrence of trouble, to reduce downtime, and to assure that the equipment is serviceable.

a. Systematic Care. The procedures given in paragraphs 29 and 30 cover routine systematic care and cleaning essential to proper upkeep and operation of the radio set.

b. Preventive Maintenance Checks and Services. The Daily Preventive Maintenance Checks and Services Chart (para 29) outlines functions to be performed daily. These checks and services are to maintain the radio set in a combat serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining combat serviceability, the charts indicate what to check, how to check, and what the normal conditions are; the References column lists the illustrations and paragraphs that contain detailed repair or replacement procedures. If the defect cannot be remedied by the operator, higher echelon maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set fourth in TM 38-750.

28. Preventive Maintenance Checks and Service Periods

Preventive maintenance checks and services of Radio Set AN/TRC-77 (*) are required on a daily basis. Paragraph 29 specifies the items to be checked and serviced. In addition to the routine checks and services, the radio set should be rechecked and serviced immediately before going on a mission and as soon after completion of the mission as possible.

29. Daily Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	Reference
PHYSICAL CHECKS			
1	Radio set	Check to make sure that all components of the radio set are present.	Appendix II and fig. 1
2	Exterior surfaces	Clean the receiver-transmitter, battery, key, and headset (para 30).	
3	Cables and connectors	Check all cables and connectors for cracks, breaks, corrosion, and dirt.	Para 30c.
4	Antenna system components	Check all antenna system components for cracks, broken insulation, cuts, corrosion, and dirt.	
5	Headset	Check the headset for ear-piece cracks, ear-cushion tears, broken or worn cable insulation, and dirty or damaged connector.	

29. Daily Preventive Maintenance Checks and Services Chart (cont)

Sequence No.	Item	Procedure	Reference
6	Key	Check the key for dust and dirt, worn or pitted contacts, broken or worn cable insulation, loose or corroded electrical connections and proper adjustment (para 13b.).	
7	Battery	Check the electrolyte level of each cell in both batteries to be sure that both batteries are fully charged.	Para 13a.

PRELIMINARY OPERATIONAL CHECKS

8	Assembly and installation	Connect the battery to the receiver-transmitter (para 13c). Install the radio set (para 15).	
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29. Daily Preventive Maintenance Checks and Services Chart (cont)

Sequence No.	Item	Procedure	Reference
9	Knobs, controls, and switches	While making the preliminary control settings (item 8), observe that the mechanical action of each knob, control, and switch is smooth and free of external or internal binding.	
10	Preliminary control settings	Set all the controls to their preliminary positions (para 19).	
11	OFF-RCVR-XMIT switch	Set OFF-RCVR-XMIT switch to RCVR. AM signal from test station can be heard at headset.	Fig. 6
12	RF GAIN control	Rotate RF GAIN control through its entire range. The signal level at the headset varies as the control is rotated.	Fig. 6

29. Daily Preventive Maintenance Checks and Services Chart (cont)

Sequence No.	Item	Procedure	Reference
13	VOL control	<p>Rotate the VOL control through its entire range.</p> <p>The signal level at the headset varies as the control is rotated.</p>	Fig. 6
14	BFO PITCH control	<p>Set the AM-CW switch to CW.</p> <p>The CW signal from the test station can be heard at the headset. Rotating the BFO PITCH control varies the frequency of the audio tone at the headset.</p>	Fig. 6
15	RCVR CHANNEL switch	<p>Repeat steps 9 through 12 above for each position of the RCVR CHANNEL switch.</p>	Fig. 6

29. Daily Preventive Maintenance Checks and Services Chart (cont)

Sequence No.	Item	Procedure	Reference
TRANSMITTER CHECKS			
		<p>Warning: The following procedures require the breaking of radio silence. This manual does not authorize the breaking of radio silence imposed by any command. Unauthorized violation of radio silence could result in courts martial or possible death from enemy fire.</p>	
16	Transmitter operation	<p>Check the transmitter operation in accordance with the procedures contained in paragraphs 20a(1) through 20a(7).</p>	
17	XMTR CHANNEL switch	<p>Repeat step 14 above for each position of the XMTR CHANNEL switch.</p>	

30. Cleaning

Inspect the exteriors of the receiver-transmitter, batteries, and accessory equipment. The exterior surfaces should be clean, and free of dust, dirt, grease, and fungus.

- a. Remove all dust and surface dirt with a clean soft cloth.

Warning: Cleaning compound is flammable and its fumes are toxic. Provide adequate ventilation. Do not use near a flame.

- b. Remove grease, fungus, and ground-in dirt from the cases; use a cloth dampened (not wet) with Cleaning Compound (Federal Stock No. 7930-395-9542).

- c. Remove dust or dirt from plugs and jacks with a brush.

- d. Clean the receiver-transmitter front panel and control knobs with a clean soft cloth. If dirt is difficult to remove, dampen the cloth with water; mild soap may be used for more effective cleaning.

- e. Clean the accessory bag with a brush and remove spots with a cloth that has been moistened with cleaning compound.

Warning: Contact with battery electrolyte can cause serious burns. If electrolyte is splashed or spilled on the skin or clothing, rinse thoroughly with water and apply a mild solution of vinegar or boric acid.

Cautions:

1. To avoid damage to battery cells and gasket, do not use solvents for cleaning the battery.
2. Do not use a wire brush on the battery because short circuiting between the cell terminals will occur and cause damage to the battery.
 - f. Remove white potassium carbonate deposits from the top of the battery cells with a stiff nylon brush.
 - g. Clean the top of the battery cells, the filtercap vent plugs, and the battery terminal links with a clean soft cloth.
 - h. If necessary, remove the filtercap vent plugs and wash with running water to remove chemical deposits. Dry the plugs with a clean soft cloth before installation.

31. Troubleshooting

The following troubleshooting information is intended for use with the Daily Preventive Maintenance Checks and Services Chart (para 29).

- a. Receiver. If a malfunction in the receiver is indicated, proceed as follows:
 - (1) Check the electrical connections on the front panel, battery, and battery cable.
 - (2) Set the OFF-RCVR-XMIT switch to OFF and replace the battery in use with the spare battery.

- (3) Repeat the receiver operations checks listed in the Daily Preventive Maintenance Checks and Services Chart (para 29). If the malfunction has not been corrected, higher echelon maintenance is required.

b. Transmitter. If a malfunction in the transmitter is indicated, proceed as follows:

- (1) Check the electrical connection at the KEY jack on the front panel.
- (2) Replace the ANT. TUNING indicator lamp (para 32).
- (3) Set the OFF-RCVR-XMIT switch to OFF and replace the battery in use with the spare battery.
- (4) Repeat the transmitter operation checks listed in the Daily Preventive Maintenance Checks and Services Chart (para 29). If the malfunction has not been corrected, higher echelon maintenance is required.

32. Repairs

The only repair that the operator is authorized to perform is the replacement of the ANT. TUNING indicator lamp which is replaced as follows:

- a. Turn the glass indicator lens on the ANT. TUNING indicator counter-clockwise and pull out to expose the lamp.
- b. Press in on the lamp and turn counterclockwise to unlock. Tilt the receiver-transmitter forward until the lamp falls out.
- c. Insert new lamp, press, and turn clockwise to lock.
- d. Install the glass indicator lens by turning it in a clockwise direction.

CHAPTER 5
ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. GENERAL

33. Scope

a. This chapter contains instructions covering second echelon maintenance of Radio Set AN/TRC-77(*). It includes instructions for performing preventive and periodic maintenance services, troubleshooting, and repair functions to be accomplished by the organizational repairman.

b. Second echelon maintenance of Radio Set AN/TRC-77(*) includes:

- (1) Preventive maintenance (para 36 through 40).
- (2) Troubleshooting (para 41 and 42).
- (3) Tube testing techniques (para 43).
- (4) Repair and replacement (para 44 through 46).

34. Internal Differences in Models

The internal differences between Radio Set AN/TRC-77 and Radio Set AN/TRC-77A do not affect second echelon maintenance.

35. Tools, Materials, and Test Equipment Required

A list of parts authorized for second echelon maintenance appears in TM 11-5820-473-20P, Organizational Maintenance Repair Parts and Special Tools List, Radio Sets AN/TRC-77 and AN/TRC-77A. The tools, materials, and test equipment required for organizational maintenance are listed below.

a. Tools. The tools required for organizational maintenance are supplied in Tool Kit TK-115/G.

b. Materials. The only material required for organizational maintenance is Cleaning Compound (Federal Stock No. 7930-395-9542).

c. Test Equipment.

(1) Multimeter AN/URM-105.

(2) Test Set, Electron Tube TV-7/U.

36. Preventive Maintenance

a. Preventive maintenance is the systematic care, inspection, and servicing of equipment to maintain it in serviceable condition, prevent breakdowns, and assure maximum operational capability. Preventive maintenance is the responsibility of all echelons concerned with the equipment and includes the inspection, testing, and repair or replacement of parts, subassemblies, or units that inspection and tests indicate would probably fail before the next scheduled periodic service. Preventive maintenance checks and services of Radio Set AN/TRC-77(*) at the second echelon level are made at monthly and quarterly intervals unless otherwise directed by the commanding officer.

b. Maintenance forms and records to be used and maintained on this equipment are specified in TM 38-750.

37. Monthly Maintenance

Perform the maintenance functions indicated in the monthly preventive maintenance checks and services chart (para 38) once each month. A month is defined as approximately 30 calendar days of 8-hour-per-day operation. If the equipment is operated 16 hours a day, the monthly preventive maintenance checks and services should be performed at 15-day intervals. Adjustment of the maintenance interval must be made to compensate for any unusual operating conditions. Equipment maintained in a standby (ready for immediate operation) condition must have monthly preventive maintenance checks and services performed on it. Equipment in limited storage (requires service before operation) does not require monthly preventive maintenance.

38. Monthly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Battery cells	Remove battery cells from the case and check for evidence of cracks or leaks.	
2	Battery case	Check case for corrosion, worn or cracked wiring insulation, or a damaged gasket.	

39. Quarterly Maintenance

Quarterly preventive maintenance checks and services on Radio Set AN/TRC-77(*) are required. Periodic monthly services constitute a part of the quarterly preventive maintenance checks and services and must be performed concurrently. All deficiencies or shortcomings will be recorded in accordance with the requirements of TM 38-750. Perform all the checks and services listed in the Quarterly Preventive Maintenance Checks and Services Chart (para 40) in the sequence listed.

40. Quarterly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Completeness	See that the equipment is complete (Appendix II).	
2	Cleanliness	See that the equipment is clean (para 30).	
3	Preservation	Check all surfaces for evidence of fungus. Remove rust and corrosion and spot-paint bare spots.	Para 30b.
4	Publications	See that all publications are complete, serviceable, and current.	DA Pam 310-4

40. Quarterly Preventive Maintenance Checks and Services Chart (cont)

Sequence No.	Item	Procedure	References
5	Modifications	Check DA Pam 310-4 to determine if new applicable MWO's have been published. All URGENT MWO's must be applied immediately. All ROUTINE MWO's must be scheduled.	TM 38-750 and DA Pam 310-4.
6	Headset	Check the headset for earpiece cracks, ear-cushion tears, broken or worn cable insulation, and dirty or damaged connector.	
7	Key	Check the key for dust and dirt, worn or pitted contacts, broken or worn cable insulation, loose or corroded electrical connections, and proper adjustment (para 13b).	

40. Quarterly Preventive Maintenance Checks and Services Chart (cont)

Sequence No.	Item	Procedure	References
8	Auxiliary power cable	Check the auxiliary power cable for broken or cracked insulation, and for damaged, dirty, or corroded connector and clips.	Para 30c.
9	Keyer adapter cable	Check the keyer adapter cable for broken or cracked insulation, and for damaged, dirty, or corroded connectors and terminals.	Para 30c.
10	Accessory bag	Check the accessory bag for dirt, mildew, and tears.	Para 30e.
11	Antenna system	Check all antenna system components for cracks, broken insulation, cuts, corrosion, and dirt.	
12	Tubes	Check receiver-transmitter tubes.	Para 43.

40. Quarterly Preventive Maintenance Checks and Services Chart (cont)

Sequence No.	Item	Procedure	References
13	Spare parts	Check all spare parts (operator and organizational) for general condition and method of storage. There should be no evidence of overstock, and all shortages must be on valid requisitions.	Appendix II and TM 11-5820- 473-20P.
14	Installation	See that the equipment is properly installed (para 15).	
15	Connections	Check to be sure that: a. Plugs and sockets are clean, intact, and not loose-fitting. b. Telegraph key and headset are connected to the KEY and PHONES jack on the front panel.	Para 30c.

40. Quarterly Preventive Maintenance Checks and Services Chart (cont)

Sequence No.	Item	Procedure	References
16	Switches, controls, and knobs	While making the operating checks (items 17 and 18) observe that the mechanical action of each switch and control is smooth and free of external or internal binding. Tighten or replace loose or damaged knobs.	
17	Receiver	Check the receiver in accordance with the Daily Preventive Maintenance Checks and Services Chart (para 29).	
18	Transmitter	Check the transmitter in accordance with the Daily Preventive Maintenance Checks and Services Chart (para 29).	

Section II. TROUBLESHOOTING

41. General

Troubleshooting of the radio set is based upon the operational check contained in the Quarterly Preventive Maintenance Checks and Services Chart. To troubleshoot the radio set, perform functions 17 and 18 in the Quarterly Preventive Maintenance Checks and Services Chart (para 40). When an abnormal condition or result is observed, note the item number in the Quarterly Preventive Maintenance Checks and Services Chart and turn to the corresponding item number in the Troubleshooting Chart (para 42). Perform the checks and corrective measures indicated in the Troubleshooting Chart. If the corrective measures indicated do not result in correction of the trouble, higher echelon maintenance is required. Paragraphs 43 through 46 contain additional information and step-by-step instructions for performing tube tests, continuity checks, and isolation of malfunctions.

42. Troubleshooting Chart

Item No.	Trouble symptom	Probable trouble	Checks and corrective measures
17	No signal audible at headset during AM operations.	a. Weak signal. b. Loose cable connection. c. Dead battery. d. Defective headset.	a. Increase VOL and/or RF GAIN. b. Check and secure all cable connections (para 15). c. Replace battery in use with fully charged spare battery (para 13c). d. Replace headset.
	Weak or intermittent signal at headset during AM operation.	a. Weak signal. b. Loose cable connection. c. Weak battery. d. Defective headset.	a. Increase VOL and/or RF GAIN. b. Check and secure all cable connections (para 15). c. Replace battery in use with fully charged spare battery (para 13c). d. Replace headset.

42. Troubleshooting Chart (cont)

Item No.	Trouble symptom	Probable trouble	Checks and corrective measures
17 (cont)	No signal audible at headset during CW operation.	BFO PITCH control requires adjustment.	Adjust BFO PITCH control.
18	ANT. TUNING INDICATOR does not light.	a. Loose cable connection. b. Defective ANT. TUNING INDICATOR lamp. c. Defective battery. d. Defective tube V201 or V202. e. Defective key. f. Wrong antenna in use.	a. Check and secure all cable connections (para 15). b. Replace ANT. TUNING INDICATOR lamp (para 32). c. Replace battery in use with fully charged spare battery (para 13c). d. Test tubes by tube substitution method (para 43b). e. Replace key. f. Replace antenna in use with correct antenna (para 15).

42. Troubleshooting Chart (cont)

Item No.	Trouble symptom	Probable trouble	Checks and corrective measures
18 (cont)	No beat signal heard at headset when transmitter is keyed.	Defective headset.	Replace headset.

43. Tube Testing Techniques

The locations of tubes used in Radio Set AN/TRC-77(*) are illustrated in figure 7. To gain access to the tubes, release the toggle clamp on each side of the receiver-transmitter and lift the chassis out of the case. During normal preventive maintenance procedures, check the tubes with Electron Tube Test Set TV-7/U as directed in step a below. When a malfunction occurs, use the tube substitution method as directed in step b below.

TM 5820-473-12-7

Figure 7. Radio set tube locations.

Warning: To avoid serious injury or death, remove all power from the receiver-transmitter before removing tube for test.

Caution: Do not rock or rotate a tube when removing it from a socket; pull it straight out with a tube puller.

a. Use of Electron Tube Test Set TV-7/U. Remove and test one tube at a time. Discard a tube only if its defect is obvious or if the tube tester shows it to be defective. Do not discard a tube that tests at or near its minimum test limit on the tube tester. Put back the original tube, or insert a new one if required, before testing the next one. Detailed instructions for operation of the tube tester are contained in TM 11-6625-274-12.

b. Tube Substitution Method. Replace tube V201 (3B4WA) with a new tube. If the equipment remains inoperative, remove the new tube and replace the original tube. Repeat this procedure with tube V202 (2E24).

44. Repair and Replacement of Connectors and Cable Assembly Components

a. Components. The following components may be repaired or replaced at the second echelon maintenance level:

- (1) The power jack on the bottom of the receiver-transmitter case.
- (2) The connector and alligator clips on the auxiliary power cable.
- (3) The connectors and terminals on the keyer adapter cable.
- (4) The connector and terminals on the cable in the battery.

b. Continuity Checks. To isolate defective cable components, perform continuity checks using Multimeter AN/URM-105 and the cable wiring diagrams shown in figure 8. Detailed operating instructions for the multimeter are contained in TM 11-6625-203-12.

Figure 8. Cable wiring diagrams.

45. Repair or Replacement of Knobs

Tighten knobs by turning the mounting screws clockwise. Replace any damaged knobs by loosening the screws at the center of the knobs and removing them. Place new knobs on the shafts and tighten the screws.

46. Replacement of Key

The telegraph key should be replaced when any of the following conditions exist:

- a. The electrical contacts are badly worn or pitted.
- b. Performance of the key adjustment procedure (para 13**b**) fails to restore the key to satisfactory operating condition.
- c. Any key components are damaged or broken.

CHAPTER 6

AUXILIARY EQUIPMENT

Section I. AC BATTERY CHARGER PP-3251(*)/TRC-77

47. Purpose

Although it is possible to operate Radio Set AN/TRC-77(*) without an ac battery charger, it is necessary to periodically recharge the radio set batteries. AC Battery Charger PP-3251(*)/TRC-77 (fig. 9) is used to recharge the radio set batteries when an ac power source is available.

TM 5820-473-12-9

Figure 9. Ac battery charger.

48. Description

a. Physical Description. The ac battery charger is a self-contained portable unit 8-3/4 inches high, 8-3/4 inches wide, and 6 inches deep. It is equipped with a power cable. The weight of the ac battery charger with cable is 23.8 lbs. The front panel controls are protected by a hinged panel which is secured at the side of the case by a toggle clamp. A carrying handle is welded on top of the case.

b. Electrical Characteristics. The ac battery charger operates on any ac source from 70 to 270 volts, at any frequency between 40 and 400 cycles-per-second. It is designed to supply an output of 12 volts dc at a current of five amperes. It has an integral timer which may be set for up to four hours continuous operation.

c. Differences in Models. AC Battery Charger PP-3251/TRC-77 has a seven-pin output connector on the front panel designed to accommodate the cable from Battery Assembly BB-447/TRC-77. The output connector on AC Battery Charger PP-3251A/TRC-77 has two pins and is designed to accommodate the cable from Battery Assembly BB-447A/TRC-77.

49. Installation

Install the ac battery charger as follows:

Caution: To avoid damage to the equipment do not connect the ac battery charger to the power source until directed to do so.

- a. Place the ac battery charger in a location adjacent to the ac power source.
- b. Place the battery to be charged next to the ac battery charger and connect the battery cable to the OUTPUT jack (fig. 9) at the top of the front panel.
- c. Set the OVERLOAD circuit breakers to ON.

50. Operation

a. Controls, Indicators, and Connectors.

Control, indicator, or connector	Function
OUTPUT connector	Connects battery charger output to battery.
Circuit breakers	Protect battery charger from over-load.
TIMER-HOURS switch	Sets timer for automatic charger operation.
OUTPUT meter	Monitors battery charging current.
OUTPUT CONTROLS	Provides coarse adjustment of output current.
COARSE switch	
FINE switch	Provides fine adjustment of output current.
OUTPUT terminals	Provide auxiliary output access.

a. Controls, Indicators, and Connectors (cont).

Control, indicator, or connector	Function
AC INPUT jack (on back of charger)	Power input connector.
FUSE (8 AMP) (on back of charger)	Provides overload protection.

b. Procedures. Operating procedures for the ac battery charger are placarded on the inside of the front panel hinged cover. The battery should be fully charged in two hours.

51. Operator's Maintenance

The maintenance duties assigned to the operator of AC Battery Charger PP-3251(*)/TRC-77 are listed below, together with references to the paragraphs covering the specific maintenance functions. The duties assigned do not require any tools or test equipment.

a. Daily Preventive Maintenance Checks and Services (para 52).

b. Cleaning (para 53).

c. Troubleshooting (para 54).

52. Daily Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Exterior surfaces	Clean the ac battery charger case and front panel.	Para 53a.

52. Daily Preventive Maintenance Checks and Services Chart (cont)

Sequence No.	Item	Procedure	References
2	Power cable	Check the power cable for cracked or frayed insulation. Check for dirt, corrosion, or bent connectors.	Para 53c.
3	Power connector	Check charger power connector for dirt, corrosion, or bent pins.	Para 53c.
4	OUTPUT jack	Check OUTPUT jack on charger front panel for dirt, corrosion, or bent pins.	Para 53c.
5	OUTPUT meter	Check OUTPUT meter for broken or cracked glass and bent pointer.	Fig. 9.
6	Installation	Check to see that the charger is correctly installed.	Para 49.

52. Daily Preventive Maintenance Checks and Services Chart (cont)

Sequence No.	Item	Procedure	References
7	Knobs and switches	While making the operating checks (item 8), observe that the mechanical action of each knob and switch is smooth and free of internal or external binding.	Fig. 9.
8	Operation	Perform the operating procedure placarded on the inside of the hinged front cover.	

53. Cleaning

Inspect the exterior surfaces of the ac battery charger. They should be clean, and free of dust, dirt, grease, and fungus.

a. Remove dust and loose dirt with a clean soft cloth.

Warning: Cleaning compound is flammable and its fumes are toxic. Provide adequate ventilation. Do not use near a flame.

b. Remove grease, fungus, and ground-in dirt from the case; use a cloth dampened (not wet) with cleaning compound (Federal Stock No. 7930-395-9542).

c. Remove dust or dirt from plugs and jacks with a brush.

Caution: Do not press on the meter face (glass) when cleaning; the meter may be damaged.

d. Clean the front panel, meter, and knobs; use a clean soft cloth. If dirt is difficult to remove, dampen the cloth with water; mild soap may be used for more effective cleaning.

54. Troubleshooting

The following troubleshooting information is intended for use with item 8 of the Daily Preventive Maintenance Checks and Services Chart (para 52).

a. Overloads. OVERLOAD circuit breakers will trip under the following conditions:

- (1) Failure to set the COURSE switch to position 1 when connecting the charger.
- (2) Turning the charger on when the battery is not connected.
- (3) Attempting to charge a battery which has one or more dry cells.

b. No Indication on OUTPUT Meter. Failure of the OUTPUT meter to give any current indication could be caused by any one of the following conditions:

- (1) Loose power connection at the rear of the charger.
- (2) One or both of the front panel circuit breakers are in the OVERLOAD position.
- (3) The TIMER-HOURS switch is in the OFF position.
- (4) The fuse at the rear of the charger is defective.

55. Organizational Maintenance

Maintenance duties assigned to the organizational repairman are listed below together with references to the paragraphs covering the specific maintenance functions. The only equipment required for organizational maintenance of the battery charger is Multimeter AN/URM-105. Detailed instructions on the operation of the multimeter are contained in TM 11-6625-203-12.

- a. Quarterly Preventive Maintenance Checks and Services (para 56).
- b. Tests (para 57).
- c. Repair (para 58).

56. Quarterly Preventive Maintenance Checks and Services Chart

Note: Before performing Quarterly Preventive Maintenance Checks and Services, the Daily Preventive Maintenance Checks and Services should be completed.

Sequence No.	Item	Procedure	References
1	Interior surfaces	Remove the back cover from the charger. Inspect the interior of the charger for loose or broken connections and defective components.	

57. Tests

a. Charger Output Check. While performing the operation portion of the Daily Preventive Maintenance Checks and Services Chart (item 8, para 52), use Multimeter AN/URM-105 to measure the battery charger output at the front panel OUTPUT terminals. The output voltage should be 12 volts dc.

b. Continuity Check. When a malfunction indicates a possible defective power cord, use Multimeter AN/URM-105 to check continuity in the power cord. One hot terminal on the line plug is connected to pin A on the connector on the opposite end of the power cord. The other hot terminal is connected to pin B on the same connector. The ground pin on the line plug is connected to pin C.

58. Repair

Second echelon repair on the ac battery charger is limited to the replacement of the line plug on the power cord.

The first part of the paper discusses the importance of the study and the objectives of the research. It also outlines the methodology used in the study and the results obtained. The second part of the paper discusses the implications of the study and the conclusions drawn from the research. The third part of the paper discusses the limitations of the study and the areas for future research.

The study was conducted in a laboratory setting and the results were compared with the results of previous studies. The study found that the results were consistent with the results of previous studies. The study also found that the results were consistent with the results of previous studies.

The study was conducted in a laboratory setting and the results were compared with the results of previous studies. The study found that the results were consistent with the results of previous studies.

Section II. DC BATTERY CHARGER PP-3252(*)/TRC-77

59. Purpose

The purpose of DC Battery Charger PP-3252(*)/TRC-77 (fig. 10) is to charge radio set batteries when no ac power source is available.

TM 5820-473-12-10

Figure 10. Dc battery charger.

60. Description

a. Physical Description. The dc battery charger consists primarily of a 1-ohm, current-limiting series resistor mounted in a case 2-7/8 inches high, 2-7/8 inches wide, and 8-1/2 inches long. A cable assembly is provided to connect the dc battery charger to the dc power source. The weight of the charger with the cable assembly is 1.9 lbs.

1. The first part of the paper discusses the importance of the study of the history of the United States. It is argued that a knowledge of the past is essential for a full understanding of the present and for the development of a sound policy for the future.

2. The second part of the paper discusses the role of the government in the development of the United States. It is argued that the government has played a crucial role in the development of the country and that its actions have shaped the course of history.

3. The third part of the paper discusses the role of the individual in the development of the United States. It is argued that the actions of individuals have played a crucial role in the development of the country and that their actions have shaped the course of history.

4. The fourth part of the paper discusses the role of the future in the development of the United States. It is argued that the future is a time of great opportunity and that the actions of the present will shape the course of the future.

b. Electrical Characteristics. The dc battery charger is designed to take its input from a 24 to 28 volt vehicle electrical system. It is normally connected across the terminals of the vehicle battery. The dc charger supplies 12 volts dc at a current of 10 amperes to the battery being charged.

c. Differences in Models. DC Battery Charger PP-3252/TRC-77 has a seven-pin output connector on the front panel designed to accommodate the cable from Battery Assembly BB-447/TRC-77. The output connector on DC Battery Charger PP-3252A/TRC-77 has two pins and is designed to accommodate the cable from Battery Assembly BB-447A/TRC-77.

61. Installation

Install the dc battery charger as follows:

a. Connect the red clip lead on the battery charger cable to the positive side of the vehicle battery.

b. Connect the black clip lead on the battery charger cable to the negative side of the vehicle battery.

c. Place the battery to be charged next to the dc battery charger.

62. Operation

To charge the battery with the dc charger, connect the battery cable to the output connector on the charger front panel. The battery should be fully charged in two hours.

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63. Operator's Maintenance

The maintenance duties assigned to the operator of DC Battery Charger PP-3252(*)/TRC-77 are listed below, together with references to the paragraphs covering specific maintenance functions. The duties assigned do not require any special tools or test equipment.

a. Daily Preventive Maintenance Checks and Services (para 64).

b. Cleaning (para 65).

64. Daily Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Exterior surfaces	Clean the dc battery charger case and front panel.	Para 65.
2	Power cable	Check the power cable for cracked or frayed insulation. Clean dirt or corrosion from cable clips.	Para 65c.
3	OUTPUT jack	Check OUTPUT jack on charger front panel for dirt, corrosion, or bent pins.	Para 65c.
4	Installation	Check to see that the charger is correctly installed.	Para 61.

The first part of the report
 describes the general situation
 and the results of the
 investigation. The second part
 contains the detailed description
 of the methods used and the
 results of the experiments.

Date	Description of the work	Remarks
1910.10.10	First experiment with the new apparatus.	Results were satisfactory.
1910.10.15	Second experiment with the new apparatus.	Results were satisfactory.
1910.10.20	Third experiment with the new apparatus.	Results were satisfactory.
1910.10.25	Fourth experiment with the new apparatus.	Results were satisfactory.
1910.10.30	Fifth experiment with the new apparatus.	Results were satisfactory.
1910.11.05	Sixth experiment with the new apparatus.	Results were satisfactory.
1910.11.10	Seventh experiment with the new apparatus.	Results were satisfactory.
1910.11.15	Eighth experiment with the new apparatus.	Results were satisfactory.
1910.11.20	Ninth experiment with the new apparatus.	Results were satisfactory.
1910.11.25	Tenth experiment with the new apparatus.	Results were satisfactory.

64. Daily Preventive Maintenance Checks and Services Chart (cont)

Sequence No.	Item	Procedure	References
5	Operation	Connect the battery cable to the OUTPUT jack on the charger front panel. Check to see that the electrolyte level rises in the battery cells as the battery charges.	Para 62.

65. Cleaning

Inspect the exterior surfaces of the dc battery charger. They should be clean, and free of dust, dirt, grease, and fungus.

a. Remove dust and loose dirt with a clean soft cloth.

Warning: Cleaning compound is flammable and its fumes are toxic. Provide adequate ventilation. Do not use near a flame.

b. Remove grease, fungus, and ground-in dirt from the case; use a cloth dampened (not wet) with Cleaning Compound (Federal Stock No. 7930-395-9542).

c. Remove dust or dirt from clips and jacks with a brush.

66. Organizational Maintenance

Maintenance duties assigned to the organizational repairman are listed below together with references to the paragraphs covering specific maintenance functions. The only equipment required for organizational maintenance of the battery charger is Multimeter AN/URM-105. Detailed instructions on the operation of the multimeter are contained in TM 11-6625-203-12.

- a. Quarterly Preventive Maintenance Checks and Services (para 67).
- b. Continuity Checks (para. 68).
- c. Repair (para 69).

67. Quarterly Preventive Maintenance Checks and Services Chart

Note: Before performing Quarterly Preventive Maintenance Checks and Services, the Daily Preventive Maintenance Checks and Services should be completed.

Sequence No.	Item	Procedure	References
1	Interior surfaces	Remove the cover from the dc charger and inspect the interior of the charger for loose or broken connections and other defects.	

68. Continuity Checks

When a malfunction is suspected in the dc battery charger, perform the following continuity checks:

a. Use the multimeter to check continuity between the black clip lead and the charger case.

b. Use the multimeter to measure the resistance between the red clip lead and pin 2 of the OUTPUT jack on the charger front panel. The resistance should be approximately 1 ohm.

69. Repair

Second echelon repair on the dc battery charger is limited to the replacement of the clips on the input power cord.

CHAPTER 7
SHIPMENT AND LIMITED STORAGE AND DEMOLITION
TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

70. Disassembly of Equipment

Disassembly procedures for Radio Set AN/TRC-77(*) consist of the following steps:

- a. Disconnect the antenna in use and untie the support cord and weight. Rewind the antenna and the support cords on their bobbins.
- b. Disconnect the counterpoise and rewind on its bobbin.
- c. Disconnect the headset and the key from the receiver-transmitter front panel.
- d. Separate the receiver-transmitter from the battery by releasing the toggle clamps on each side of the battery case.
- e. Stow the antenna system components, auxiliary power cable, keyer adapter cable, key, and headset in the accessory bag.

71. Protecting Transported Equipment

- a. Equipment that is to be removed from service for periods exceeding approximately two weeks, or equipment that is to be shipped for use by other personnel or activities, is normally repackaged by second echelon personnel. Refer equipment to second echelon for repackaging.

b. If the radio set is to be transported over short distances under control of the using unit for immediate re-use:

- (1) Place the receiver-transmitter, batteries, and accessory bag upright in a corrugated or wooden box.
- (2) Use rags or crumpled paper for padding to separate components from each other and from the sides of the box.

72. Repackaging for Shipment or Limited Storage

The following procedures are intended for use by second echelon personnel. Whenever possible, original packaging materials should be used. Refer to figure 4 for typical packaging of the radio set.

a. Material Requirements. The following materials are required for packaging Radio Set AN/TRC-77(*). For stock numbers of materials, consult SB 38-100, Preservation, Packaging and Packing Materials, Supplies, and Equipment Used in the Army.

Material	Quantity
Waterproof paper	6 sq ft
Waterproof tape	20 ft
Cotton twine	50 ft
Corrugated cardboard	16 sq ft
Adhesive tape	12 ft
Filler material	6 lbs

b. Packaging. The components of Radio Set AN/TRC-77(*) are to be packaged as outlined below.

- (1) Accessory bag. Place the accessory bag within a wrap of corrugated cardboard. Secure the wrap with gummed tape.
- (2) Receiver-transmitter. Cushion the receiver-transmitter front panel with a pad of filler material. Secure the filler material with gummed tape.
- (3) Wrap the technical manuals in waterproof paper and seal with waterproof tape.

c. Packing.

- (1) Place the receiver-transmitter, batteries, and accessory bag in a fiberboard box or carton. Separate the individual components with corrugated cardboard as required. Use filler material to cushion each item as required.
- (2) Place the technical manual package on top of the radio set components, cover with a corrugated cardboard spacer, and seal the box or carton with gummed tape.
- (3) Pack the radio set carton in a nailed wooden crate either separately or together with other radio sets as illustrated in figure 4.

Section II. DEMOLITION OF MATERIAL TO PREVENT ENEMY USE

73. Authority for Demolition

Demolition of the equipment will be accomplished only upon the order of the commander. The destruction procedures outlined in paragraph 73 will be used to prevent further use of the equipment.

74. Methods of Destruction

Use any of the following methods to destroy the equipment.

a. Smash. Smash the controls, tubes, coils, batteries, headset, key, switches, capacitors, and transformers; use sledges, axes, handaxes, pick-axes, hammers, or crowbars.

b. Cut. Cut the antennas, counterpoise, auxiliary power cable, and keyer adapter cable; use axes, handaxes, or machetes.

c. Burn. Burn cords and technical manuals; use gasoline, kerosene, oil, flame throwers, or incendiary grenades.

d. Bend. Bend panel and case.

e. Explode. If explosives are necessary, use firearms, grenades, or TNT.

f. Dispose. Bury or scatter the destroyed parts in slit trenches, fox holes, or throw them into streams.

APPENDIX I

REFERENCES

Following is a list of references applicable and available to the operator and organizational repairman of Radio Set AN/TRC-77(*).

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders.
SB 38-100	Preservation, Packaging and Packing Materials, Supplies, and Equipment.
TM 11-5820-473-20P	Organizational Maintenance Repair Parts and Special Tools List: Radio Sets AN/TRC-77 and AN/TRC-77A.
TM 11-6625-203-12	Operation and Organizational Maintenance, Multimeter AN/URM-105
TM 11-6625-274-12	Operation and Organizational Maintenance, Test Sets, Electron Tube, TV-7/U, TV-7A/U, TV-7B/U, and TV-7D/U.
TM 38-750	The Army Equipment Record System and Procedures.

APPENDIX II
BASIC ISSUE ITEMS LIST

(To be supplied)

APPENDIX III

MAINTENANCE ALLOCATION CHART

(To be supplied)

GLOSSARY

Section I. ABBREVIATIONS

ac	alternating current
agc	automatic gain control
am	amplitude modulation
amp	ampere
ant.	antenna
bfo	bent frequency oscillator
cw	continuous-wave
db	decibel
dc	direct current
ft	feet
grd	ground
in.	inches
kc	kilocycles
lb(s)	pound(s)
ma	milliampere
max	maximum
mc	megacycle
mcw	modulated continuous-wave
mw	milliwatt

ABBREVIATIONS (cont)

mwo	modification work order
rcvr	receiver
rf	radio frequency
sq. ft	square feet
v	volt
vol	volume
xmit	transmit
xmtr	transmitter

Section II. DEFINITIONS OF UNUSUAL TERMS

Automatic gain control. A method whereby the over-all gain of a receiver is automatically adjusted to produce a constant output signal for varying input signals.

Bandwidth. The numerical difference between the highest and lowest frequencies passed by an electrical circuit.

Beat frequency oscillator. A receiver circuit which produces a radio frequency signal that is mixed with an incoming continuous-wave signal to produce an audio frequency tone.

Decibel. A unit for expressing the ratio of two amounts of electric or acoustic signal power.

Armature. The movable part of an electro magnetic device.

Electrolyte. A non-metallic electric conductor in which current is carried by the movement of ions.

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